

B. Optometry Syllabus

FIRST SEMESTER

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
1	BO-101	Geometrical Optics (Optics I)	3	1		4	4
2	BO-102	Physiology (General)	3	1		4	4
3	BO-103	Anatomy (General)	3	1		4	4
4	BO-104	Biochemistry (General & Ocular)	3	1		4	4
5	BO-105	Professional Communication in English	3	1		4	4
Total of Theory						20	20
PRACTICAL							
1	BO-192	Physiology (General)			4	4	4
2	BO-191	Geometrical Optics-1			4	4	4
3	BO-193	Anatomy			4	4	4
Total of Practical						12	12
<u>Total of Semester</u>				32		32	

SECOND SEMESTER

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
1	BO-201	Physical Optics (Optics II)	3	1		4	4
2	BO-202	Physiology (Ocular)	3	1		4	4
3	BO-203	Anatomy (Ocular)	3	1		4	4
4	BO-204	Environment & Ecology	3	1		4	4
5	BO-205	Computer Fundamentals & Programming	3	1		4	4
Total of Theory						20	20
B. PRACTICAL							
1	BO-291	Physical Optics II			4	4	4
2	BO-293	Anatomy (Ocular)			4	4	4
3	BO-295	Computer			4	4	4
Total of Practical						12	12
<u>Total of Semester</u>				32		32	

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THIRD SEMESTER

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
1	BO-301	Visual Optics (Optics III)	3	1		4	4
2	BO-302	Lighting & the Eye	3	1		4	4
3	BO-303	Medical pathology & Microbiology (General & Ocular)	3	1		4	4
4	BO-304	Pharmacology	3	1		4	4
5	BO-305	Ophthalmic & Optical Instrumentation & Procedure I	3	1		4	4
Total of Theory						20	20
C. PRACTICAL							
1	BO-393	Microbiology & Pathology			4	4	4
2	BO-395	Optical & Ophthalmic Instrumentation			4	4	4
3	BO-392	Lighting & the Eye			4	4	4
Total of Practical						12	12
<u>Total of Semester</u>				32		32	

FOURTH SEMESTER

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
1	BO-401	Visual Optics (Optics IV)	3	1		4	4
2	BO-402	Ophthalmic & Optical Instrumentation & Procedure II	3	1		4	4
3	BO-403	Clinical Refraction I	3	1		4	4
4	BO-404	Ocular Disease I (Anterior Segment Disease)	3	1		4	4
5	BO-405	Ophthalmic Lens & Dispensing Optics	3	1		4	4
Total of Theory						20	20
B. PRACTICAL							
1	BO-492	Optics & Ophthalmic instrumentation II			4	4	4
2	BO-493	Clinical Refraction Practical			4	4	4
3	BO-495	Ophthalmic Lens & Dispensing Optics Practical			4	4	4

B. Optometry Syllabus

Total of Practical	12	12
<u>Total of Semester</u>	32	32

FIFTH SEMESTER

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
1	BO-501	Binocular Vision & Ocular Motility	3	1		4	4
2	BO-502	Contact Lens I	3	1		4	4
3	BO-503	Clinical Refraction II	3	1		4	4
4	BO-504	Ocular Disease II (Posterior & Neuro-eye Disease)	3	1		4	4
5	BO-505	Low Vision Aids & Visual Rehabilitation	3	1		4	4
Total of Theory						20	20
B. PRACTICAL							
1	BO-592	Contact Lens -I			4	4	4
2	BO-593	Clinical Refraction II			4	4	4
3	BO-595	Low Vision Aids & Visual Rehabilitation			4	4	4
Total of Practical						12	12
<u>Total of Semester</u>			32			32	

SIXTH SEMESTER

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
1	BO-601	Systemic Condition & the eye	3	1		4	4
2	BO-602	Public Health & Community Optometry	3	1		4	4
3	BO-603	Biostatistics	3	1		4	4
4	BO-604	Contact Lens II	3	1		4	4
5	BO-605	Professional Practice Management	3	1		4	4
6	BO-606	Applied Optometry & Orthoptics	3	1		4	4

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Total of Theory						24	24
B. PRACTICAL							
1	BO-694	Contact Lens-II			4	4	4
2	BO-696	Applied Optometry & Orthoptics			4	4	4
Total of Practical						8	8
<u>Total of Semester</u>						32	32

B.OPTM

DETAILED SYLLABUS

1ST YEAR 1ST SEMESTER

PROFESSIONAL COMMUNICATION IN ENGLISH

P.CODE: BO105

Contact: 3L+1T

Credits: 4

- Grammar-structure of sentences etc.
- Essay- Descriptive-Comparative-Argumentative etc.
- Reading Comprehension from recommended text etc.
- biodata, Resume-curriculum vitae etc.
- Report writing-structure, types of reports etc.
- Communication-public speaking skills, features of effective speech etc.
- Group discussions-principle-practice etc.

Reference books: a. Communication (Mark McCormack)
b. How to write reports (John Metcchell)
c. Business Correspondence and Report R.C. Sharma & K.Mohan)
(Tata Mc Graw , New Delhi 1984)

1ST YEAR 1ST SEMESTER

ANATOMY (General)

P.CODE: BO103

Contact: 3L+1T

Credits: 4

Introduction of anatomy – gross human anatomy & their relations :

- The skeleton – axial & appendicular (over view), Cavities of body- (cranial, thoracic, abdominal, pelvic). Structure of bone, Type & function of bone, Blood & nerve supply of the bone. Planes of the body. Anatomical terminology.
- Skull – General features, Cranial bones (frontal, parietal, temporal, occipital, sphenoid, ethmoid). Facial bone – (nasal, maxilla, zygomatic, lacrimal, palatine, inferior nasal conchae, vomer, mandible). Special feature of the skull (sutures, paranasal sinuses, foramina, fontanelles, nasal septum).

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- Joints – classification, fibrous joints, cartilaginous joints, synovial joints(structure & types). Types of movement at sinovial joints.
- Anatomy of muscular system – Skeletal muscle structure. Important skeletal muscle (muscles of facial expression, mastication. Muscle that move the head). Over view of Trunk muscles, upper limb muscles, lower limb muscles.
- Anatomy of nervous system – spinal cord anatomy (external & internal anatomy). Connection & distribution of spinal nerves-overview(Branches, plexuses. Intercostal nerves). Overview of brain organization & blood supply. Brief anatomical idea on – brain stem, cerebellum, diencephalon, cerebrum. Cranial nerves

Embryology – general

Gametogenesis(spermatogenesis & oogenesis) –Structure of testis,ovary &sperm –Phases of embryonic development – formation of three germ layers- derivatives of germ layers –Embryonic or Foetal membrane (chorion, amnion, allantois, yolk sac) &placenta & its functions.

Cell Structure:

Ultra structure and functions of cell- Plasma membrane- Nucleus – Mitochondria- Centrosome- Ribosome-Endoplasmic reticulum- Golgi body & lysosome. Nucleus – Ultra structure & functions.

Chromosomes:

Structure & chemical composition, types of chromosome. Chromosome aberration.

Cell Division: Amitosis- Mitosis- Meiosis- Significance of mitosis & meiosis- Cell cycle.

Tissues:- Structure, position and functions of epithelial, connective, muscular & nervous tissue.

1ST YEAR 1ST SEMESTER

PHYSIOLOGY

P.CODE: BO102

Contact: 3L+1T

Credits: 4

GENERAL PHYSIOLOGY

1.Basic Biological (Biophysical & Biochemical) Principles:

Diffusion, surface tension and viscosity – their characteristics, factors influencing and biological applications. Osmosis – osmometers, laws of osmosis, biological applications, relation with depression of freezing points. Acids, bases and pH. Colloids – classification, properties – optical and electrokinetic, biological importance of colloids. Dialysis and ultra-filtration. Chromatography: Principles & applications, Electrophoresis: Principles & applications, Gel electrophoresis. Ultracentrifugation: moving boundary and density gradient ultracentrifugation. Adsorption. Gibbs-Donnan equilibrium. Radioactivity – radioisotopes and their biological applications. Principles of radioimmunoassay (RIA), autoradiography. The resting membrane potential. The action potential. Electrotonic potentials. Propagation of nerve impulse in different types of nerve fibers. Compound action potentials.

2. Genetics:

Nucleic acid- 1. Structure of DNA- Physical & Chemical properties of DNA & RNA, Ultra structure & types of DNA & RNA(in details), Brief idea about super coiling of DNA Semiconservative mode of replication of DNA, Mechanism of replication of DNA, Genetic code. Genetically relation of color blindness and ocular albinism. Chromosome aberration- Structural aberration- Deletion- Duplication- Inversion- translocation. Numerical aberration (Polyploidy & aneuploidy- Hyper & hypo). Gene mutation- classification-spontaneous & Induced- Chemical mutation- Practical Application of mutation.

3. Blood Vascular system

Composition and functions of blood. Plasma proteins – normal values, origin and functions. Brief idea on Bone marrow. Formed elements of blood – origin, formation, functions and fate. Hemoglobin – functions, compounds and derivatives. Abnormal hemoglobin-overview. Thalassemia-brief idea. Different types of anemia and their

B. Optometry Syllabus

causes-overview. Erythrocyte sedimentation rate (ESR) and its significance. Hematocrit. PCV, MCV, MCH, MCHC. Blood volume – normal values, regulation. Blood coagulation – factors, process, anticoagulants, Prothrombin time. Clotting time. Bleeding time. Blood groups – ABO systems and Rh factors. Blood transfusion. Ultra structure & functions of blood vessels (artery & vein). Structure type and function of capillaries. Differences between artery & vein.

4. Muscular Physiology:

Microscopic and electron microscopic structure of skeletal, smooth and cardiac muscles. Difference between skeletal, smooth and cardiac muscles. The sarcotubular system. Red and white striated muscle fibers. Single unit and multi unit smooth muscle. Motor point. Properties of muscle: excitability and contractility, all or none law, summation of stimuli, summation of contractions, effects of repeated stimuli, genesis of tetanus, onset of fatigue, refractory period, tonicity, conductivity, extensibility and elasticity. Electromyography. Muscle contraction – E C Coupling. Muscle fatigue, Rigor mortis, Sliding filament theory, Slow & fast muscle fibers, Isotonic & Isometric contraction.

5. Neuro Physiology

Electron microscopic structure of nerve cell or neurons. Neuroglia. Myelinated and unmyelinated nerve fibers. Conduction velocity of nerve impulse in relation to myelination and diameter of nerve fibers. Properties of nerve fibers – excitability, conductivity, all-or-none law, accommodation, adaptation, summation, refractory period, indefatigability. Concept of chronaxie and rheobase. Synapses – types, structure, synaptic transmission of the impulse, synaptic potentials, neurotransmitters. Motor unit. Injury to peripheral nerves – degeneration and regeneration-brief idea.

Automatic nervous system – Introduction, Comparison of autonomic & somatic nervous system, Anatomy of autonomic motor pathways – Pre-ganglionic neurons, autonomic ganglia, sympathetic ganglia, autonomic plexus, post-ganglionic neurons structure of sympathetic and parasympathetic division. ANS- neurotransmitter and receptors- cholinergic neurons & receptors. Receptor agonist & antagonist. Physiological effect of ANS- sympathetic & parasympathetic response. Integration & control of autonomic function- autonomic Reflexes, autonomic control by higher centers.

Neural Transmission- Introduction, Autonomic Synaptic Transmission-Modes of transmission, sympathetic & parasympathetic response. CNS Synaptic transmission-Electrical synaptic transmission & chemical synaptic transmission.

Neuro muscular Junction – The neuromuscular junctions – structure, events in transmission, end-plate potential, post tetanic potential.

6. Cardio Vascular System –

Structure & function of Heart & blood vessels (artery, vein and capillary) (Anatomical position, chambers of heart.) Blood circulation through heart. Special junctional tissue of heart.(Myogenic and neurogenic heart-conducting system of heart. E.C.G. Cardiac cycle. Heart Sound , Blood vessels – type, Structure & function, Systemic & pulmonary circulation. Blood – composition, Function, blood group, Blood clotting. Cardiac cycle and cardiac output. Blood Pressure-regulation & controlling factors.

7. Renal System- Function of kidney, Anatomy & Histology of Nephron & collecting duct. – Urine formation(Filtration, reabsorption and secretion)- Counter – current system of urine concentration, Anomalies in urine concentration.

1ST YEAR 1ST SEMESTER

GEOMETRICAL OPTICS-I

P.CODE: BO101

Contact: 3L+1T

Credits: 4

- What is light- dual nature- particle & wave nature, speed, wave length & frequency of light.
- Fermat's principle- laws of relation & refraction at a plane surface using Fermat's principle.
- Snell's law, relative and absolute refractive indices, total internal reflection and Critical angle, refraction by plane parallel slab of glass; molecular basis of reflectivity

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(basic index).

- Geometrical path length & optical path length of rays, Concept of wave fronts & rays, concept of vergence-divergence, convergence.
- Refraction by spherical surfaces- convex & concave, Derivation of vergence equation, focal points, deoptee power, image point, lateral & axial magnification, simple numerical.
- Thin Lens- shapes, derivation of lens makers' formula, thin lens vergence equation, equivalent focal length of two thin lenses separated by a distance & placed in contact, lateral magnification of thin lenses in contact, simple numerical, concept of reduced systems.
- Thick Lens- Cardinal points & planes, front & back vertex power, matrix theory in paraxial Optics to locate positions of cardinal planes. Different types of aberrations & their effects.
- Prism- Dispersion of prism, reflecting prisms, prisms diopters.
- Geometrical theory of optical fibers. Uses of optical fibers.

1 BIOCHEMISTRY

P.CODE: BO104

Contact: 3L+1T

Credits: 4

1. Basic concept & metabolism of carbohydrate, protein & fat. Process of glycolysis, glycogenolysis, TCA cycle-significance. Non Protein Nitrogen, Nitrogen balance, Metabolism of Amino acids, Transamination, Deamination. Process of β -oxidation of unsaturated fatty acid, α & ω oxidation overview.

2. Amino acids, protein structure-

- a. Amino acids- Function, classification, properties
- b. Protein - Primary, secondary, tertiary & quaternary structures & the bond involves.

3. Brief outline: Enzyme-

General characteristics, classification, Factors affecting enzymatic activity. Kinetics of Enzyme – km. Michaelis Menten equation. Line Weaver Burk plot. Enzyme Inhibition – Reversible & Irreversible. Allosteric enzyme.

4. Oxygen transporting protein

Hemoglobin & Myoglobin – Structure & their characteristics. Comparison between hemoglobin & myoglobin. Oxygen transporting Mechanism of Hemoglobin affinity for Oxygen. Bohr's effect

5. Vitamins

Water & Fat soluble Vitamins. Vitamins- A,D,E,KP,C B complex- source, daily requirement, Metabolism, Functions, deficiency.

6. Basic outline of hormone action

Physical & Chemical Characteristics of hormone. Types of hormone. General mechanism of hormone action via Messenger system. Source & importance of different hormones-STH, ACTH, GTH, T4, parath hormone, Insulin, Glucagon, Glucocorticoid, Mineralocorticoid, Melatonin, Estrogen, Progesteron, Testosterone & HCG

7. **Cornea** – Biochemical composition of cornea. Sources of Nutrients-Oxygen, Glucose, Amino acid. Metabolic pathway in cornea – Glycolysis, HMP shunt.

8. Tear film-

Functions of Tear film. Different layers of Tear film. Chemical composition of tears. Tear film abnormalities. Tests for film Adequacy.

9. **Lens** – Biochemical composition of lens. Lens protein – their types & characteristics. Lens Metabolism - Carbohydrate metabolism, protein metabolism. Cataract – Due to biochemical defects of lens. Antioxidant mechanism in the lens.

10. Biochemistry of the visual process-

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Photopigments – Rhodopsin & Iodopsin. Chemical nature of Rhodopsin. Visual cycle (Bleaching of Rhodopsin, Transducin cycle, Role of Phosphodiesterases).

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1ST YEAR 1ST SEMESTER

PRACTICAL SYLLABUS

PHYSIOLOGY (General)

P.CODE: BO-192

Contact: 4P

Credits: 4

1. Identification of fixed histological slides – nerve tissues (cerebellum, cerebral cortex, neurons, spinal cord, nodes of Ranvier, corneal cell space), renal tissues. Blood vessels (artery & vein), skin, Tongue, Liver.
2. Hemoglobin estimation
3. Determination of blood pressure
4. Determination of BT, CT, ESR
5. Blood film making & identification of different blood corpuscle.
6. ECG wave identification
7. Measurement of TC of RBC & WBC & DC of WBC.
8. Determination of Blood Group (ABO; Rh).

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1ST YEAR 1ST SEMESTER

PRACTICAL SYLLABUS

GEOMETRICAL OPTICS-1

P.CODE: BO-191

Contact: 4P

Credits: 4

- 1 Determination of the focal length & hence the power of a convex lens by displacement method.
2. Determination of the refractive index of a transparent liquid by using a travelling microscope.
3. Determination of the refractive index of the material of a convex lens measuring its focal length, using the lens & a plane mirror.
4. Determination of the focal length of a concave mirror by graphical method.

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5. Determination of refractive index of the material of a prism by minimum deviation method.
6. To draw $i-\delta$ curve of a prism by a spectrometer & hence to find out the angle of minimum deviation.

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1ST YEAR 2ND SEMESTER

PRACTICAL SYLLABUS

ANATOMY

P.CODE: BO-193

Contact: 4P

Credits: 4

1. Identification of skull & skeleton (bones) [Skull-bones comprising, base of skull orbits]
2. Identification of organs & viscera
3. Identification of histological tissues .
 - a) Epithelial tissue-squamous, columnar, cuboidal
 - b) Connective tissue-skeletal muscle, cardiac muscle, smooth muscle
 - c) Cytology-mitosis.

B.OPTM DETAILED SYLLABUS

1st YEAR 2nd SEMESTER

CODE-BO 202

Contact: 3L+1T

Credits: 4

PHYSIOLOGY (Ocular)

1. Cornea:

Brief idea about ultra & histological structure of cornea. Corneal transparency & hydration, Regulation of corneal transparency & hydration. Corneal vascularization. Maurice theory & Goldman's theory

2. Uveal tissue:

Brief idea about uvea. Uveal meshwork. Uveo-scleral drainage. Schlemm's canal switch.

3. Lens:

Basic idea about human lens. Function of lens. Lens transparency. Lens culture. Changes in ageing lens. Cataract – overview.

4. Aqueous humour:

Formation of Aqueous humour. Drainage & circulation of Aqueous Humor. Rates of production & flow. Functions of Aqueous humour.

5. Vitreous Humour:

Composition & distribution of vitreous humour, Physiology & function of vitreous humour, Optical role of vitreous humour.

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6. Retina:

Retinal structure-layers of retina. Brief idea about rod & cones. Organization of retina. Function of retina.

7. Optic Nerve: Physiology of optic nerve. Papilledema of optic nerve. Optic atrophy.

8. **Ocular Circulation** : Vascular structure of the eye – ocular circulation, blood-ocular barrier (Blood-retinal, blood Vitreous & blood aqueous barrier). Regulation of ocular circulation.

9. Protective Mechanism of the eye –

- a. Blinking – muscles of lid closer & lid opening (orbicularis oculi, levator palpebre, Muller's muscle, blinking reflexes).
- b. Lacrimation –
 - i) Lacrimal glands
 - ii) Pre corneal tear film
 - iii) Chemistry of lachrymal secretion tear film
 - iv) Tear film dynamics (secretion of tear, formation of tear, retention & redistribution of tear, displacement phenomena, evaporation from tear film, drying & breakup of tear film, dynamic events during blinking, elimination of tear.)

10. The ocular motor system –

- a. Extra ocular muscles their function & nerve supply
- b. Mechanics of actions of extra ocular muscles -cross sectional area of muscle, length of muscle. Arc of contact, muscle plane, Muscle axis of rotation.
- c. Physiology of ocular movement – Basic Kinematics, (position of gaze, Fick's axes)
- d. Ocular Movement (monocular and Binocular). Supra nuclear control of eye movements.
- e. Ocular movements -
 - i) Monocular Movements (Adduction, Abduction, supraduction, Infraduction, Incycloduction, excycloduction)
 - ii) Binocular Movements –VERSIONS- (saccadic & pursuit movement, position maintenance movements, stabilization movements & their characteristics). VERGENCES – (Convergence, divergence, vertical vergence),

11 . Intraocular pressure –

Features of normal IOP, Factors influencing the IOP, Control of IOP, Measurement of IOP.

12. Pupil –

Normal pupil, Physiological changes in pupil size – Isocoria, Pupillary unrest, Hippies. Pupillary reflex – Light reflex, Near reflex, Darkness reflex , Psycho sensory reflex, Lid closure reflex

13. Accommodation –

- a. Far point , near point, range & amplitude of Accommodation
- b. Mechanism of accommodation – Increased tension theory, Relaxation theory, Role of lens capsule, Gullstrand mechanical model of accommodation,
- c. Stimulus for accommodation
- d. Ocular changes in accommodation.
- e. Changes in accommodation with age (Presbyopia)
- f. Nervous mechanism for accommodation

14. Color vision-

- a. Physiological, Photochemical & neurological basis of color vision
- b. Electrophysiology of color vision
- c. Granit's modulator and dominator theory, Purkinje phenomenon. Young-Helmholtz theory
- d. Types of color defects
- e. Color blindness
- f. Neural analysis

15. Geniculate cortex:

- a. Structure of geniculate cortex.
- b. Electrophysiology

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- c. Projection – retinal projection
- d. Detail idea about visual cortex & function of visual cortex.

16. Visual perception –

Higher integrative activity, Binocular perception, stereoscopic depth perception.

- b. Neurophysiology of perception – Higher visual pathways(primary visual Pathway to cerebral center, Lateral Geniculate body, non-geniculate targets for retinofugal input, visual center)
- c. Neurophysiology of perception – Spatial analysis, Double pathway to higher visual centers.

17. Physiology of vision –

a. Visual acuity – visual angle, Components of Visual acuity (Minimum visible, Resolution , Recognition Hyperacidity), Factors affecting, Measurement of visual acuity.

b. Contrast Sensitivity – Types- (spatial & Temporal contrast sensitivity), Neural Mechanism, Measurement of contrast sensitivity (Arden gratings , Cambridge low contrast gratings, Pelli – Robson chart)

c. Light & Dark adaptation – Dark adaptation curve, Mechanism of dark adaptation, Factors influencing dark adaptation, Time course of light adaptation, Mechanism of light adaptation, Rod vs. cone light adaptation. Parkinje shift of spectral sensitivity.

d. Binocular vision – Grades of binocular vision (simultaneous, fusion & stereopsis), Advantages of binocular vision, visual direction & horopter, Binocular fusion, Dichoptic stimulation , Depth perception, Integration of motor & sensory system.

e. Electrodiagnostic tests – ERG, EOG, VER

1st YEAR 2nd SEMESTER

CODE: BO 203

Contact: 3L+1T

Credits: 4

ANATOMY (Ocular)

1. Embryology –ocular

Formation of optic vesicle & optic stalk, formation of lens vesicle, formation of optic cup, changes in associated mesoderm, development of various structure of eye ball – retina, optic nerve, crystalline lens, cornea, sclera, choroid, ciliary body, iris, vitreous. Development of accessory structures of eyeball – eyelids, lacrimal apparatus, extra-ocular muscles, orbit. Milestones in the development of the eye.

2. Orbit

Bony orbit→ Size, shape & relations, walls of the orbit , Base of the orbit, Apex of orbit.

Orbital fascia →Fascial bulbi, Fascial sheaths of extraocular muscles, intermuscular septa.

Spaces of orbit → Orbit fat & reticular tissue - Apertures at the base of orbit- Contents of the orbit - Orbital nerve→ oculomotor , Trochler, Abducent, Trigeminal, facial nerves - their functional components, course & distribution, clinically applied aspects.

3. Cornea→ (a)Layers & peculiarities,(b). Blood supply & nerve supply of cornea. .(c) Corneal Transparency.

4. Lens , Zonules → (a) Structure. of lens →capsule, Ant. Epithelium, lens fibers (structured & zonal arrangement), (b). Ciliary zonules →structure gross appearance,(c). Arrangement of zonules fibers.

5.Uveal Tract & its vascular supply→(a). Iris macroscopic & microscopic appearance . (b) ciliary body – Macroscopic structure.(c). chloride - Macroscopic structure.(d) Blood supply to uveal structure- short & Long Posterior artery & Anterior Artery. (e). Venous drainage.

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6.Vitreous- main masses of vitreous. Base of the vitreous. Hyaloidean vitreous. Vitreous cells.

7. Sclera – Anterior, posterior & middle apertures. Episclera. Sclera proper. Lamina fusca. Blood supply of the sclera. Nerve supply of the sclera.

8. Anterior chamber and its angle- angle of the anterior chamber. Trabecular meshwork. Canal of Schlemm. Schwalbe's line. Drainage of aqueous humor.

9. Retina & its vascular supply → (a). Gross anatomy,(b). Microscopic structure of fovea centralize, (c). Blood retinal barrier.(d.) Anatomy of optic nerve, (e). Anatomy of optic nerve, (f.) optic chiasma optic tracts, (g) Lateral Geniculate body, (h). optic radicalism (i). visual cortex, (j). Arrangement of nerve fibers.(K). Blood supply of visual pathways (Arterial circle of willis & its branches).

10.The Ocular motor system → Extraocular muscles, nerve supply, motor nuclei, supra nuclear motor centers.

11.The pupillary & ciliary muscle →Anatomy of sphincter & Dilator muscle. Ciliary muscle – Anatomy, types
12. The nerve supply of the eye ball.

13.The lachrymal appears → (a) Lachrymal gland, (b) Palpebral part, (c) Duets of lachrymal gland, (d) structure of the lachrymal gland, (e) Blood supply & nerve supply of the lachrymal gland, (f) lachrymal passages.

14. Anatomy of the Ocular Adnexa & glands; Lids - a. Structures of the lids: - Skin, Subcutaneous Areolar Layer, Layer of Striated muscle, Submuscular Areolar Tissue, Fibrous Layer, Conjunctiva. Glands of the Lids- Meibomian Glands, Glands of Zeis and Glands of Moll. Blood Supply of the Lids, Lymphatic Drainage of the Lids, Nerve Supply of the Lids.
Conjunctiva - Palpebral Conjunctiva, Bulbar Conjunctiva, Conjunctival Fornix, Microscopic Structure of the conjunctiva- Epithelium, Substantia Propria. Conjunctival Glands→ Krause's Glands, Wobbling's Glands, Henley's Glands, Manz Glands. Blood Supply of the Conjunctiva, Nerve Supply of the Conjunctiva, Caruncle, Plica Semilunaris.

1st YEAR 2nd SEMESTER

CODE-BO205
Contact: 3L+1T
Credits: 4

COMPUTER FUNDAMENTALS AND PROGRAMMING

Basic computer Architecture:

Fundamentals of Computers, Block diagram of PC, peripheral devices of PC and their functions

Number System & Data Representation:

Decimal Number System, Binary number system, Decimal to Binary conversion, Binary operations. Octal number system & the conversion. Octal to Decimal. Binary to Octal & Vice Versa.

Boolean Algebra:

Definition, Difference between Boolean with Arithmetic & ordinary algebra. Two valued Boolean Algebra. Basic theorems of Boolean Algebra. Precedence of operators. Boolean function & truth tables. The AND, OR, NOT gate. DeMorgan's theorem. The NOR, NAND gate. The XOR & X-NOR gate. Conversion of Boolean expression into logic diagram. Using AND, OR, AND, NOT gates.

Logic Circuits:

Combinational logic circuit, Adder, Subtractor, Decoder, Encoder.

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Operating System:

Introduction & classification of software, working principle of MS DOS (Some basic internal & external commands). Creating a file. Windows & its components. Accessories, program manager, main, desktop icons.

MS- Office:

Introduction of word processing-invoking MS-word – create, edit, save document, cut & paste perform operations on blocks of text, header & footer, Mail Merge, printer setup. Introduction of EXCEL. Concept of worksheet, making Charts & graphs, perform calculations & re calculations.

C-Language:

Overview of C , algorithm & flow chart, datatypes. Variables & constants, operators, expressions & assignment statements, control statements, arrays in C (One dimensional).

Introduction to Internet:

Basic concepts of Internet.

1st YEAR 2nd SEMESTER

PHYSICAL OPTICS

CODE: BO 201

Contact: 3L+1T

Credits: 4

- **Dual nature of light-** Simple harmonic motion- differential; Simple harmonic waves- mathematical representation; Super position of simple harmonic waves.
- **HUYGENS' principle** – laws of reflection and refraction at plane and spherical surfaces. Wave velocity & group velocity; determination of velocity of light (any one method.)
- **Interference:** Coherence; path and phase difference; Theory of interference fringes- intensity distribution in fringes; Young's double slit experiment- Fresnel's biprism, Lloyd's error experiments; visibility of fringes.
- **Interference in thin films due to reflected and transmuted light-** Interference in wedge shaped films; Newton's ring experiment ; Color of thin films; Thin film antireflection coating and filters.
- **Diffraction:**
 - Diffraction by single slit; double slit, multiple slit- grating, circular aperture – amplitude & intensity distribution (final expressions only)
 - Circular aperture- airy pattern, resolution by circular apertures.
 - Diffraction grating- reflection, transmission , amplitude & phase gratings(definitions in brief) Grating dispersion & dispersive power, spectral resolution; zone plates.

Polarization & Crystal Optics:

- Concept of polarization , linear , circular , elliptical polarization (qualitatively), Plane of polarization & vibration, degree of polarization, polarizers, analyzers, Production of polarized light, birefringence, calcite crystal , Nicol prism, Wallaston prism , retarders - full, half & quarter wave plates, analysis of light of unknown Polarization.
- Linear Scattering- Rayleigh & Mie
- Principles of LASERS
- Holography – basic principle; simple experimental arrangement, some applications.

B. Optometry Syllabus

1st YEAR 2nd SEMESTER

ENVIRONMENT & ECOLOGY

Paper Code: BO-204

Contact: 3L+1T

Credits: 4

General

Introduction, components of the environment, environment degradation.

Ecology

Elements of Ecology; Ecological balance and consequences of change, principles of environmental impact assessment.

Air Pollution and Control

Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.

Water Pollution and Control

Hydrosphere, natural water, pollutants: their origin and effects, river/lake/ground water pollution, standards and control.

Land Pollution

Lithosphere, pollution (municipal, industrial, commercial, agricultural, hazardous solid wastes); their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Noise Pollution

Sources, effects, standards and control.

B.OPTM DETAILED SYLLABUS

1st YEAR 2nd SEMESTER

PRACTICAL

PHYSICAL OPTICS-II

Paper Code: BO-291

Contact: 4P

Credits: 4

1. To determine the wavelength of a monochromatic light source with the help of Fresnel's Bi-prism.
2. To determine the radius of curvature of convex surface of a lens by Newton's ring method.
3. To determine Planck's constant using photocell.
4. To study the diffraction through a single slit & to determine its width.
5. To determine the slit width & the separation between the slits of a double slit system from its Fraunhofer diffraction pattern.
6. Determination of the wavelength of monochromatic light using diffraction grating.
7. To calibrate a Polarimeter & hence to determine the unknown concentration of sugar solution.
8. To determine the wavelength of the Laser source by forming diffraction pattern with transmission grating.

B. Optometry Syllabus

ANATOMY (OCULAR)

Paper Code: BO-293

Contact: 4P

Credits: 4

1. Identification of ocular histology slides.
2. Identification of projection slides of Ocular Anatomy.
3. Identification of structure & related viva.

COMPUTER

Paper Code: BO-295

Contact: 4P

Credits: 4

Operating System:

Introduction & classification of software, working principle of the DOS (some basic internal & external commands). Creating a file, batch processing. Autoexec Bat files. Windows & its components-Accessories, program manager, desktop icons.

MS- Office:

Introduction of word processing-invoking MS-word – create, edit, save document, cut & paste perform operations on blocks of text, header & footer, Mail Merge, printer setup. Introduction of EXCEL. Concept of worksheet, making Charts & graphs, perform calculations & re calculations.

C-Language:

Overview of C , algorithm & flow chart, datatypes. Variables & constants, operators, expressions & assignment statements, control statements, arrays in C (One dimensional).

SYLLABUS

2nd YEAR 1st SEMESTER

MICROBIOLOGY & PATHOLOGY (General & Ocular)

Paper Code: BO-303

Contact: 3L+1T

Credits: 4

Microbiology

Bacteria: Cell structure, elementary idea about classification and morphological basis. Staining reactions: Gram staining, spore staining, acid fast staining. Bacterial growth: nutritional requirements, physical factor affecting, culture media, and growth curve. Elementary idea about bactericidal agents: Phenol, alcohol. Sterilization(principles, types & methods). Pasteurization. Antibiotics: Bacteriostatic and bactericidal effects.

Virus: elementary knowledge of viral-morphology, viral genome and classification, viral replication. Herpes viruses, hepatitis viruses, miscellaneous viruses, human immunodeficiency viruses.

Microbial growth & death, Laboratory culture, host pathogen interactions, antimicrobial chemotherapy, pathogenic mechanisms common to external ocular infections process – clinical pathology.

B. Optometry Syllabus

Physiology, pathology, treatment & epidemiology of infectious diseases caused by bacteria, virus, fungi & parasitic organisms with emphasis to disease with ocular manifestations & infectious eye diseases in hot climate as in India. AIDS & eye.

General Pathology

Structure & function of immune system – Structure and function of thymus, spleen & red bone marrow- Immunity & its types, plasma proteins & immune reaction, cells involved in immune system. Humoral immunity theories of antibodies formation. Structure & function of lymph nodes. Structure & function of thymus, spleen & red bone marrow. Non specific immunity, Antibody mediated immunity, specific immunity, cell mediated immunity, Active immunity, Passive immunity.

The acute inflammatory reaction – changes in acute inflammation, changes in the calibre of the blood vessels, changes in blood flow, changes associated with exudation. Local sequelae of acute inflammation. The chemical mediators of acute

Inflammation & Repair:

inflammation. Role of the mast cell in inflammation. Role of the platelets in inflammation. Chronic inflammation – cause, classification, general features.

Source of infection. Transmission of organisms to the body. wound infections. Wound healing.

Immuno-pathogenesis – type I, II, III & IV hypersensitivity. Mechanism of autoimmunity. Organ specific & non organ specific auto immune disease. The HLA system – histocompatibility complex. Pyogenic & bacterial infection. Graft rejection-basic outline.

Disorder of growth – metaplasia, dysplasia, neoplasia. Circulatory disturbances – thrombosis, infarction, ischemia, embolism. Degeneration (calcification).

2nd YEAR 1st SEMESTER

OPTICAL & OPHTHALMIC INSTRUMENTATION & PROCEDURE I

Paper Code: BO-305

Contact: 3L+1T

Credits: 4

- Detailed study of the Principles of operation, types, optical properties, constructions, adjustments and applications of the following Instruments and Devices:
- Binoculars, telescopes and projectors.
- Simple and Compound Microscopes (with Huygens and Ramsden Eye pieces and oil immersion objectives). Spectrometer.
- Radiuscope
- Retinoscopes
- Standard Tests Charts.
- Autorefractometer- subjective and objective types
- Ophthalmoscopes- direct and indirect types.
- Refractometers- Auto refractors, Diopticon
- Slit lamp Biomicroscope
- Keratometer
- Lensometer
- Trial case lenses-best forms.
- Trial frame design.
- Cross cylinder.

Books:

1. Introduction to Visual Optics, Alan H. Tuma (1987)
2. Clinical Optics- 2nd ed (1991)- A.R. Elington & H.J. Frank

B. Optometry Syllabus

3. Optics & Refraction-L.P. Agarwal.
4. Clinical Optics- Borish.

2nd YEAR 1st SEMESTER

VISUAL OPTICS (OPTICS III)

Paper Code: BO-301

Contact: 3L+1T

Credits: 4

- Review of Geometrical Optics: From Geometrical Optics.
- Schematic and reduced eyes and their properties.
- Optical constants of the eye and their measurement. Purkinje images. Corneal curvature and thickness. Keratometry and pachometry. Indices of aqueous and vitreous.
- Optical Defects of the Eye- Shape of Cornea, Shape & RI of the lens, Optical axis, Visual axis (angle alpha, Fixation axis (angle gamma), Aberration of the Optical system of eye, Depth of focus, Diffraction & resolving power.
- Emmetropia and ametropia, Axial versus spherical ametropia, Myopia Hypermetropia(Hyperopia) Astigmatism.
- Accommodation- possible mechanism of accommodation- Schiener disc experiment- theories of accommodation- modern theory- changes in the lens during accommodation- the amplitude of accommodation- the measurement of the amplitude of accommodation- depth of field, luminance and blur tolerance- amplitude of accommodation versus age.
- Presbiopia-near vision addition- estimate of addition-unequal near vision addition- effect of changing the spectacle distance – hypermetropia and accommodation.

Books:

1. Principles & Practice of Refraction, Duke Elder
2. Ophthalmic Optics & Refraction (System of Ophthalmology-Vol. 5), Duke Elder
3. Visual Optics & Refraction- A clinical approach, David D. Michaels
4. Borish's-Clinical Refraction.

2nd YEAR 1st SEMESTER

LIGHTING & THE EYE

Paper Code: BO-302

Contact: 3L+1T

Credits: 4

- Eye and Vision: Spectroradiometric curve- V_{λ} - λ curve- photopic and scotopic vision CIE standard observers.
- Photometric quantities and units- Luminous Flux, Lumen- Illuminance, lux Luminous intensity, Candela – Luminance, Candela/m². Inverse square law and Cosine law of illumination (Illuminance)
- Photometry- Lumer Brodhum photometer, Guild Flicker photometer- Photocells photo multipliers – photodiodes-noise in physical photometers. Determination lighting of Polar curve of lamps.
- Calculation- Application of inverse square law and Cosine law- Matt surfaces- Lumen method of lighting design – utilization factor, light loss factor, Glare and glare index- disability glare- discomfort glare- control of glare- contrast

B. Optometry Syllabus

- Light sources- Special energy distribution- luminous efficacy- color rendering properties- Flicker contracts- Daylight, its properties- color lamp – Incandescent .lamps - low pressure Hg-lamps- High pressure Hg-lamps- Low-pressure NA- lamp- High pressure NA-lamps- Typical applications.
- Lighting Installation- Luminaries their design function up lighting – down lighting mounting position- Choice of lighting equipment- lighting system management.
- Recommended level of illuminance for various including those in optometry and ophthalmology driving etc.
- VDU- Design of work station – Flicker color contrast- Regulations regarding the use of VDU.
- Eye Protectors- their constructions standard relating to eye protection

Books:

Illumination Engineering, J. B. Murdoch.

2nd YEAR 1st SEMESTER

PHARMACOLOGY (General & Ocular)

Paper Code: BO-304

Contact: 3L+1T

Credits: 4

General Pharmacology:

- Nature & Sources of drug. Routes of drug administration (general & Ocular). New drug delivery systems. Absorption & Bio availability of a drug. Distribution of a drug. Fate of a drug. Drug excretion & toxicity. Pharmacokinetics of drugs.
- Drug action→ site of drug action, structure activity relationship. Drug receptor. Mechanism of action of a drug. Dose response relationship. Adverse drugs reactions (ADR) in man, Manifestations of ADR. Treatment of Acute drug poisoning. Factors influencing drug metabolism & drug action. Classification of drugs.
- Drug action on the nervous system→ General Considerations. Aliphatic Alcohol's. General Anesthetics. Sedatives, Hypnotics and Pharmacotherapy of Insomnia. Drugs Effective in Convulsive Disorders. Opioid Analgesics. Analgesic – Antipyretics and Nonsteroidal Anti- inflammatory Drugs(NSAID). Central Nervous System Stimulants. Local Anesthetics→ Cocaine, Procaine and Other Synthetics Local Anesthetics. Autonomic Nervous System → General Considerations. Adrenergic and Adrenergic Blocking Drugs.

Ocular

- Preparation and packaging of ophthalmic drugs
- Drug action and effectiveness
- Ocular penetration
- Ophthalmic diagnostic drugs.
- Topical anesthetics
- Ophthalmic Drugs – antibiotics, corticosteroids, anesthetics, viscoelastics agents. Antiglaucomic drugs.

2nd YEAR 1st SEMESTER

PRACTICAL SYLLABUS

MICROBIOLOGY & PATHOLOGY

Paper Code: BO-393

Contact: 4P

Credits: 4

B. Optometry Syllabus

1. Gram Staining of bacteria
2. Slide Identification of nonvirulent bacteria's & pathogens.
3. Preparation of common stains used in microbiology & pathology (Eosin Haematoxylin Leishmann Stain etc.)-(Demonstration).

OPTICAL & OPHTHALMIC INSTRUMENTATION

Paper Code: BO-395

Contact: 4P

Credits: 4

To study the operations of the following instruments:-

1. Focimeter or Lensometer.
2. Retinoscope.
3. Standard Test Charts.
4. Autorefractometer.
5. Slit Lamp Examination.
6. Keratometer.
7. Ophthalmoscope.

LIGHTING & THE EYE

Paper Code: BO-392

Contact: 4P

Credits: 4

1. Determine the unknown candle Power of the given clear incandescent lamps of different wattage (at least three) using a Lummer-Brodhun photometer. Plot C.P. vs. wattage curve & determine the C.P. that would be due to another lamp of different watt of the same make from the curve.
2. Determine the mean horizontal candlepower of a lamp using Flicker Photometer.
3. Determine the surface luminance of the given (painted) incandescent lamp of different wattage by using L.B. Photometer & extrapolate the results to obtain the surface luminance corresponding to a lamp of different watt of the same make.
4. Calibrate the given physical photometer consisting of a photocell & a micrometer for at least five luminous intensities & three external circuit resistances. Use the calibrated photometer to determine C.P. of the given lamp.
5. Use a calibrated Luxmeter to measure the levels of illumination at least 15 working places in the college. Identify the locations & note the measured levels at each location, indicating whether the measured values agree with the prescribed values for comfortable vision. If there are considerable deviations, suggest what to do.

SYLLABUS

2nd YEAR 2nd SEMESTER

VISUAL OPTICS (OPTICS IV)

Paper Code: BO-401

Contact: 3L+1T

Credits: 4

- Correction of ametropia

B. Optometry Syllabus

- Correction of myopia- spectacle refraction (F) – ocular refraction(K) – Relationship between F and K. correction of hypermetropia- the effect of vertex distance change. Correction of ametropia with Thick lenses. Some problems involving K.
- Clear and blurred images in the reduced and simplified schematic eyes. The visual axis. Pupil size and blur disc diameter. Depth of field . retinal image size in uncorrected reduced eye. Spectacle magnification in reduced and corrected eyes. Nodal points and clear image size. Retinal images with a near object. Spectacle magnification in near vision. The simple magnifier. Relative spectacle magnification. Correction of spherical ametropia with contact lens. Spectacle magnification with a contact lens.
- Ammetropia in the actual human eye. The growth of the human eye in emmetropia. Spherical ametropia in adult eye. Genetic aspects of refractive error. Summary of the causative factors involved in ametropia . Progressive myopia. Juvenile stress myopia.
- Aphakia. Reflective error in aphakia. The retinal image size in aphakia. Correction of aphakia by a contact lens. Use of an intracocular implant. Power of the implant and retinal image size. Clinical aspects of aphakia.
- Astigmatism.→ Oblique astigmatism. Astigmatism in the reduced eye. Th retinal images of point and extended objects. Classification of astigmatism. Correction of astigmatism by sphero- cylindrical, toric and contact lenses.
- Retinoscopy – principle and use. Clinical recording of standard of vision-visual acuity.
- Review of subjective refractive methods. Problem of review of objective refractive methods Cross-cylindrical method of detecting astigmatism
- Eye as an imaging instrument. Schematic eyes. Diffraction and the eye. Image formation in wave optics. Aberrations of the lens and cornea. Chromatic aberration of the eye. Optical performance of the eye. Total performance of the eye. Variation of visual performance with focus. Contrast sensivity of the eye.

2nd YEAR 2nd SEMESTER

OPHTHALMIC LENS & DISPENSING OPTICS

Paper Code: BO-405

Contact: 3L+1T

Credits: 4

Ophthalmic lens :

1.Characteristics of lenses:

Introduction. Spherical lenses. Plano-cylindrical lenses. Sphero-cylindrical lenses. Designation of lens power. Power of lenses. Transposition. Write the prescription. Base curve of spherical lens. Base curve of cylindrical single vision lens. Aberration of lens. Prism prescription. Prism effects in a lens. Neutralization.

2.Spectacle lenses:

Characteristics of lens materials. Specific gravity (weight). Refractive index. Abbe number. Impact resistance. Scratch resistance. Curve variation factor.

3.Current materials:

Crown glass. CR-39. High –index glass. High –index plastic. Poly carbonate. Photochromatic materials.

4.Lens types:

Single vision lens. Bi-focal lenses. Tri-focal lenses. Vocational & occupational multifocal progressive lenses.

5.Introduction of bi-focal lenses:

History of bi-focal lenses. Modern bi-focal designs. Types of bi-focal designs. Glass tri-focal lenses. Invisible multi-focal Double segment lens. Plastic bi-focals.

6.Ophthalmic lens coating:

B. Optometry Syllabus

Anti-reflecting coatings. Special notes concerning anti-reflecting coatings. Protective coating, color coating.

7. Absorptive lenses:

Classification of lens tints. Chemical that produces color & assist in absorptive characteristics of glass lenses. Effect in prescription on lens color. Availability of tinted lenses.

8. Impact resistant lenses:

Types of impact resistant lenses. Plastic lenses. Impact resistant Dress-Eye wear lenses. Tempered glass lenses. Types of impact resistant lenses most beneficial of specific patients.

9. Lens for special uses:

Fresnel lenses. Thinlite lenses. Lenses for the Aphakic patient. Aspheric lenses.

10. Lens surfacing & quality. Principles of lens surface generation. Glass assessment. Faults in lens materials & lens surface. Inspection of lens quality.

Basics of dispensing:

1. Spectacle frame

Current frame materials:

- a) Plastics
- b) Metals

Frame types:

- a) Combination of frames
- b) Half-eye frames
- c) Mounts
- d) Nylon-cord frame
- e) Special purpose frames.

2. Frame measurements:

- a) The boxing system
- b) The datum system
- c) Comparison of the two systems
- d) Lens position
- e) Segment specification

3. Frame Selection:

- a) Fashion
- b) Function
- c) Feel
- d) Conflicting needs
- e) Price
- f) Standard alignment

4. Lens Selection:

- a) Ground rule for selection
- b) Selection criteria

5. Facial Measurement:

- a) The PD
- b) Visual axes
- c) Measuring inter papillary distance
- d) Using PD ruler
- e) Common difficulties in measuring PDs
- f) Measuring monocular PD
- g) Measuring near PD

6. Measuring heights:

- a) Single vision

B. Optometry Syllabus

- b) Multi focal
 - c) Bi-focal
 - d) Progressive
7. Pediatric Dispensing:
- a) The changing image of spectacle
 - b) Age differences.
- Frame Selection
- a) Technical Criteria
 - b) Fashion criteria
 - c) Some tips on selection
- Lens Selection
- Technical criteria
- a) Communicating with kids.
 - b) The kids corner
- Facial measurement of the kids
- a) PDs
 - b) Centers
 - c) Bi-focals
8. Dealing with problems:
- a) Dealing with clients
 - b) Common client problems
 - c) Dealing with professional colleagues
 - d) Dealing with the laboratories
9. Special needs dispensing:
- a) Occupational dispensing
 - b) Hazards in the work place
 - c) Occupational health safety legislation
 - d) Common hazards.
10. Eye protection:
- a) Industrial eye protection
 - b) Sport
 - c) Standards covering eye protection
 - d) Lens materials & impact resistance
 - e) Frame & eye protection.

2nd YEAR 2nd SEMESTER

OCULAR DISEASE -I (Anterior Segment Disease)

Paper Code: BO- 404

Contact: 3L+1T

Credits: 4

- Anterior segment ocular diseases involving orbit, eyelids, adnexa, conjunctiva, cornea, uvea, sclera, anterior chamber, iris and lens. Symptomatology, clinical signs, diagnosis, pathogenesis, pathophysiology, systemic disease relationships and treatment of degenerative, infections and inflammatory conditions affecting these structures.
- Disease of the Lids – Congenital Deformities of the Lids .Oedema of the Lids. Inflammatory Conditions of the Lids. Deformities of the Lid Margins. Deranged Movement of the Eyelids. Neoplasm's of the Lids. Injuries of the Lids.
- Diseases of the Lachrymal Apparatus-. Dry Eye. Disease of the Lachrymal Gland. Disease of the Lachrymal Passages. Operations for Chronic Dacryocystitis.

B. Optometry Syllabus

- Disease of the Conjunctiva- Subconjunctival Haemorrhage Infective Conjunctivitis. Follicular Conjunctivitis. Granulomatous Conjunctivitis. Allergic Conjunctivitis. Conjunctivitis Associated with Skin conditions. Degenerative conditions of the Conjunctiva. Vitamin- A Deficiency. Cysts and Tumours of the Conjunctiva. Conjunctival Pigmentation . Injuries of the Conjunctiva.
- Disease of the Cornea –Congenital Anomalies. Inflammation of the Cornea (Keratitis). Superficial Keratitis. Deep Keratitis. Vascularisation of Cornea. Opacities of the Cornea. Keratoplasty. Corneal Degenerations. Corneal Dystrophy's. Corneal Pigmentation. Corneal Injuries. Refractive Corneal Surgery. Corneal Ulcer (Bacterial , Viral , Fungal)
- Disease of the Sclera- Episcleritis. Scleritis. Staphyloma of the Sclera. Blue Sclerotic Scleromalacia Perforans. Nanophthalmos. Injuries of the Sclera.
- Disease of the Iris.-. Congenital Anomalies. Inflammations (Anterior Uveitis) . Specific Types of Iridocyclitis . Degenerations of the Iris. Cysts and Tumours of the Iris. Injuries of the Iris.
- Disease of the Ciliary Body- Inflammations of the Ciliary Body. Purulent Iridocyclitis (Panophthalmitis) . Evisceration . Sympathetic Ophthalmia. Vogt- Koyanagi – Harada Syndrome. Tumours of the Ciliary body. Injuries of the Ciliary body.
- Glaucoma- .Formation of Aqueous Humor. Drainage of Aqueous. Intraocular Pressure(IOP) . Ocular Rigidity.

Tonography. .Developmental Glaucoma (Buphthalmos) . Primary Narrow Angle Glaucoma. Primary Open Angle Glaucoma. Normotensive Glaucoma . Ocular Hypertension . Secondary Glaucoma. Surgical Procedures for Glaucoma(Steps Only) ,YOGPI ,trabeculectomy.Laser Procedure in Glaucoma . Artificial Drainage Devices in Glaucoma Surgery(Molteno).

- Disease of the Lens- Congenital Malformations. Cataract . Congenital and Developmental Cataract . Senile Cataract. Traumatic Cataract. Complicated Cataract. Secondary Cataract . After Cataract. Dislocation of the Lens. Surgical Procedures for Removal of the Lens(Operative Steps Only). Phacoemulsification(ICCE,ECCE,IOL) . Small Incision Cataract Surgery (Manual Phaco).Intra-ocular Lens Implantation-AC+PC, IOL.

2nd YEAR 2nd SEMESTER

CLINICAL REFRACTION –I

Paper Code: BO-403

Contact: 3L+1T

Credits: 4

1. Ophthalmic Case Historian: Demographic data, chief complaints, secondary complaints, ocular history, medical history, drugs and medications, family ocular history, family medical history, social history, review of system, few example of history writing.
2. Recording Visual Acuity: Distance – Snellens and log MAR. near-points/'M'/RS, use of Bailey-lovie word reading chart.
3. Objective Refraction: Streak Retinoscopy – all procedures to use streak retinoscope; static and dynamic retinoscopy, different methods of dynamic retinoscopy – MEM, Nott's, Sheard's, Low and high neutral, Bells, Cross, Taits. Other methods of retinoscopy-Radical, Near(Mahandra), Chromoretinoscopy, String Lensbar, use of objective and autorefractor.
4. Subjective Refraction: Monocular Distance – Classic fogging, testing of astigmatism under fog fixed astigmatic dial (clock dial), rotary astigmatic dial, combination of fixed and rotary dial (Fan and Block test), J.C.C. Duochrome or Bichrome, Binocular balancing – alternate occlusion, prism dissociation, dissociated duochrome balance, Borish dissociated fogging, equalization
5. Binocular Distance – T.I.B. (Turville Infinity Balance), Polarized – Target and polarized filter, fogging.
Near subjective refraction.

B. Optometry Syllabus

Cycloplegic refraction, cycloidemia, sudden unfogging , Borish delayed spherical end point, pinhole estimation of refractive error, stenopaic slit refraction, measurement of vertex distance, distometer, use of subjective autorefractor.

Different methods of measuring amplitude of accommodation.

Correction of Presbyopia – Different methods of stimulation of tentative presbyopic addition – amplitude of accommodation, J.C.C., NRA-PRA balance, Bichrome, Plus Build-up, based on age, Dynamic retinoscopy. Occupational consideration, finalization of odd for near and intermediate-different options of correction.

Measurement of IPD and significance.

Final discussion with the patient.

Writing prescription of power and counseling

REFERENCES:

1. Borish's clinical refraction – I. M. Borish, W. J. Benjamin – W. B. Saunders Co.
2. Primary care Optometry – Theodore – Butterworth-heinemann.
3. Clinical Procedures in Optometry – Eskridge, Amos, Bartlett.-J. B. Lippincott Co.
4. The Ocular Examination : Measurement and Findings – Karla Zadnik

2nd YEAR 2nd SEMESTER

OPTICAL & OPHTHALMIC INSTRUMENTATION & PROCEDURE –II

Paper Code: BO-402

Contact: 3L+1T

Credits: 4

Principles, clinical use (methods) & significance of following instruments:

- Tonometer – Principles, types, clinical importance as a routine procedure (application)
- Pachometer – Principles, types, clinical importance
- Devices for color vision testing – CS testing / Glare testing.
- Ultrasonography – (A scan, B scan) – Principles and application.
- F.F.A – Principles and demonstration of film.
- PAM – Principles and importance.
- Perimeter – Basics of perimetry – Humphray instruments, Automated perimetry – basics, types(names) , interpretation of normal Glaucoma Field of Definition.
- LASER – Introduction – Einstein co-efficient, population inversion.
Different types of LASER (mention) – Excimer, Lasik
Nd-yag, Argon, Diode, He-Ne gas LASER, Xenon.
LASER safety, Ophthalmic LASER application(Argon, Yag)

Code: BO-492

Contacts: 4P

Credits:4

Optics & Ophthalmic Instrumentation II (Practical)

Clinical use of the following instruments & the findings:

- Tonometer
- Devices for color vision testing
- Auto Perimeter-Normal HFA, printout

B. Optometry Syllabus

- A-scan:- Normal Print Out & analysis
- B-scan:- Normal Print Out & analysis

Code: BO-493

Contacts: 4P

Credits: 4

Clinical Refraction (Practical)

- History writing
- Recording VA
- Practice of Streak Retinoscopy
- Direct Ophthalmoscopy-Normal Fundus
- Subjective refraction – fogging, clockdial, fan, JCC, prism balance, TIB, duochrome, cyclodeimia, Slit refraction
- Measurement of amplitude of accommodation.
- Presbyopic add
- Writing prescription.

Code: BO-495

Contacts: 4P

Credits:4

Optthalmic Lens & Dispensing Optics (Practical)

- a) Find out the menidean & optical center of ophthalmic lens
- b) Neutralization – manual & help of lensometer
- c) Identification of lens-spherical, cylindrical & spheno-cylindrical lenses
- d) Lens-surfacing & edging, cutting & marking of single vision bifocal progressive
- e) Frame measurement: The boxing system, the datum system. Comparison of the two systems, Lens position, segment specification
- f) Frame selection: Fashion, function & standard alignment
- g) Lens selection : Ground rule for selection, selection criteria.
- h) Facial measurements: The PD, Visual axes, & measuring inter-pupillary distance using P.D ruler. Common difficulties in measuring P.D , Measuring monocular P.D, measuring near C.D.
- i) Measuring heights :- single vision , bifocal, multifocal, progressive
- j) Pediatric dispensing

SYLLABUS

3rd YEAR 1st SEMESTER

OCULAR DISEASE II (Posterior Segment & Neuro-ophthalmic Disease)

Paper Code: BO-504

Contact: 3L+1T

Credits: 4

- Diseases of the Vitreous Humor- Congenital Anomalies. Vitreous Opacities. Hereditary Vitreo – Retinal Degeneration's. Vitreous Haemorrhage .Detachment of Vitreous Humor . Vitreous Surgery .
- Methods of clinically assessing the posterior segment (direct & indirect ophthalmoscopy)

B. Optometry Syllabus

- Disease of the Retina- Congenital & Dev. Defects. Inflammation of the Retina(Retinitis) . Retinal Vasculitis . Oedema of the Retina. Haemorrhage of the Retina. Vascular Occlusion . Retinal Arteriosclerosis. Retinopathies . Retinal Telangiectasis. Degeneration's of the Retina. Detachment of the Retina. Surgical Procedures for Retinal Detachment .Tumours of the Retina. Phakomatoses,. Injuries of the Retina.
- Disease of the Optic Nerve- Congenital Anomalies. Papilloedema. Inflammation of the Optic Nerve(Optic-Neuritis). Ischaemic Optic Neuropathy . Optic Atrophy. Tumours of the Optic Nerve. Injuries of the Optic Nerve.
- Symptomatic Disturbances of Visual Function – Visual Field Defects . Amblyopia. Amaurosis. Night Blindness. Day Blindness. Defects in Color Vision. Congenital Word Blindness. Malingering.

Neuro –eye disease:

Evaluation of optic nerve disease

Clinical features of optic nerve dysfunction., Optic disc changes. Optic atrophy. Special investigation.

Classification of optic neuritis

Optic neuritis and demyelination

Systemic features of multiple sclerosis, Special investigation. Optic neuritis.

Other causes of optic neuritis

Parainfectious optic neuritis. Infectious optic neuritis.

Non-arteritic anterior ischaemic optic neuropathy

Arteritic anterior ischaemic optic neuropathy

Clinical features of giant cell arteritis. Special investigation. Arteritic anterior ischaemic optic neuropathy.

Leber hereditary optic neuropathy

Hereditary optic atrophies

Kjer syndrome. Behr syndrome. Wolfram syndrome.

Alcohol-tobacco amblyopia

Drug-induced optic neuropathies

PAPILLOEDEMA

Raised intracranial pressure - Causes. Hydrocephalus. Systemic features. Clinical features of papilloedema

Differential diagnosis.

CONGENITAL OPTIC NERVE ANOMALIES

Without neurological associations

- ◆ Tilted disc.
- ◆ Optic disc drusen.
- ◆ Optic disc pit.
- ◆ Myelinated nerve fibers.

With neurological associations

Optic disc coloboma.

- ◆ Morning glory anomaly.
- ◆ Optic nerve hypoplasia.
- ◆ Aicardi syndrome.
- ◆ Miscellaneous anomalies.

PUPILLARY REACTION

Applied anatomy.

Abnormal pupillary reactions

- ◆ Afferent pupillary conduction defects
- ◆ Argyll robertson pupils
- ◆ Differential diagnosis of light-near dissociation
- ◆ Adie pupil
- ◆ oculosympathetic palsy (horner syndrome)

NYSTAGMUS

Classifications

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Causes

- ◆ Physiological nystagmus.
- ◆ Motor imbalance nystagmus.
- ◆ Ocular nystagmus.
- ◆ nystagmoid movements.

SUPRANUCLEAR DISORDER OF EYE MOVEMENTS

Conjugate eye movements

- ◆ Saccadic movements.
- ◆ Smooth pursuit movements.
- ◆ Non-optical reflexes.

Supranuclear gaze palsies

- ◆ Horizontal gaze palsies.
- ◆ Vertical gaze palsies.

THIRD NERVE DISEASE

Applied anatomy

Clinical aspects

- ◆ Clinical features.
- ◆ Aberrant regeneration.
- ◆ Causes isolated third nerve palsy.

FOURTH NERVE DISEASE

Applied anatomy

Clinical aspects

- ◆ Clinical features.
- ◆ Causes of isolated fourth nerve palsy.

SIXTH NERVE DISEASE

Applied anatomy

Clinical aspects

- ◆ Clinical features.
- ◆ Causes.

DISORDERS OF CHIASM

Classification

Applied anatomy

Applied physiology

- ◆ Hyperpituitarism.
- ◆ Hypopituitarism.

Pituitary adenoma

- ◆ Clinical features.
- ◆ Special investigation.
- ◆ Treatment.

Craniopharyngioma

Meningioma

DISORDERS OF RETROCHIASMAL PATHWAYS AND CORTEX

Clinical features of optic tract lesion

Lesions of optic radiations

- ◆ Applied anatomy.
- ◆ clinical features.

Lesions of striate calcarine cortex

Migraine

Clinical features

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Management

OCULAR MYOPATHIES AND RELATED DISORDERS

Myasthenia gravis

- ◆ Clinical features.
- ◆ Special investigations.
- ◆ Treatment.

Ocular myopathies

Myotonic dystrophy

- ◆ Systemic features.
- ◆ Ocular features.

Essential blepharospasm

- ◆ Clinical features.
- ◆ Treatment.

NEUROFIBROMATOSIS

Neurofibromatosis type-1(NF-1)

- ◆ Systemic features.
- ◆ Ocular features.

Neurofibromatosis type-2(NF-2)

3rd YEAR 1st SEMESTER

BINOCULAR VISION & OCULAR MOTILITY

Paper Code: BO-501

Contact: 3L+1T

Credits: 4

Grades of binocular vision-simultaneous perception (first grade of binocular vision), fusion, stereopsis (third grade of binocular single vision). Advantages of binocular vision. Visual direction and the horopter, visual direction, corresponding point and normal retinal correspondence, horopter, physiologic diplopia. Binocular fusion-panum's area, fixation disparity, theories of binocular fusion, synergy hypothesis of panum, local sign hypothesis of hering, eye movement hypothesis of helmholtz, suppression hypothesis of du tour and verhoef, physiologic basis of fusion.

Dihoptic stimulation-depth with fusion and depth with diplopia, diplopia without depth, retinal rivalry and suppression, binocular luster. Stereopsis-physiological basis of stereopsis, local and global stereopsis and fusion, stereopsis acuity neurophysiology of stereopsis.

Depth perception-steropsis, nonstereoscopic clues to the perception of depth under binocular condition, monocular clues (non stereoscopic clues to spatial orientation)-parallax movements, linear perspective overlay of contours, size distance from horizon, distribution of highlights, shadow, shades and light. Aerial perspective, influence of accommodation and convergence on depth perception, conclusion. Integration of the motor and sensory system into binocular vision.

Binocular defects:

Binocular optical defects-anisometropia-vision in anisometropia, treatment. Binocular optical defects-aniseikonia-symptoms, clinical investigation, treatment. Binocular muscular co-ordination-orthophoria-binocular vision. Binocular muscular anomalies-heterophoria-the causes of imbalance, exophoria, esophoria, hyperphoria, cyclophoria, symptoms of heterophoria, treatment. Binocular muscular anomalies-heterotropia—the vision in concomitant strabismus, treatment. Binocular muscular co-ordination-convergence-voluntary and reflex convergence, reflex convergence, the measurement of convergence, the relation between accommodation and

B. Optometry Syllabus

convergence, binocular accommodation, fatigue of convergence. Binocular muscular anomalies-anomalies of convergence and other reading difficulties—insufficiency of convergence, convergence excess, the ophthalmologist and the reading ability of children.

BINOCULAR VISION TEST:

Test for simultaneous macular perception, test for fusion, test for stereopsis-synoptophore or stereoscope test, vectograph test, titmus stereo test, random dot stereogram test, simple motor task test based on stereopsis.

Eye movements: the orbit anatomy of the extraocular muscles. Interactive dynamics of orbital mechanisms & brain stem neurophysiology – outline of extra ocular muscle control. Extra ocular muscles-their function & nerve supply. Mechanics of actions of extra ocular muscles -cross sectional area of muscle, length of muscle. Arc of contact, muscle plane, Muscle axis of rotation.

Physiology of ocular movement – Basic Kinematics, (position of gaze, Fick's axes)

Ocular movements - Monocular Movements (Adduction, Abduction, supraduction, infraduction, Incycloduction, excycloduction). Binocular Movements –VERSIONS- (saccadic & pursuit movement, position maintenance movements, stabilization movements & their characteristics). VERGENCES – (Convergence, divergence, vertical vergence), Supra nuclear control of eye movements.(the superior colliculi, the occipital cortex, the psycho optical reflexes & fixation.

Oculomotor system: vestibular – ocular reflexes, optokinetic reflexes. Diagnosis & clinical aspects of ocular anomalies & disorders.

Converge through a spectacle lens. Prismatic effects in spectacle lenses.

Text:

Binocular vision Anomalies & Procedures for vision therapy, By Griffies

3rd YEAR 1st SEMESTER

CONTACT LENS - I

Paper Code: BO-502

Contact: 3L+1T

Credits: 4

- a) Contact lens history & development. Benefits of contact lens over spectacle. Manufacturing methods-spin cast, Lethe cut, Cast modeling.
- b) Slit lamp Examination technique
- c) Corneal topography- Keratometry & Extended Keratometry
- d) Contact lens optics-Contact lens & spectacle lens. Back vertex calculation. Contact lens & Tear lens system.
- e) Classification of contact lens & its material (soft & RGP); Material property.
- f) Contact lens terminology. RGP & soft lens design. FDA classification of contact lens material.
- g) Patient selection & prescreening. Indications & contra indications of contact lens.
- h) Soft spherical contact lens fitting & Assessment.
- i) Soft contact lens case & maintenance.
- j) Spherical RGP contact lens fitting & assessment.
- k) RGP contact lens care & maintenance.

3rd YEAR 1st SEMESTER

LOW VISION AID & VISUAL REHABILITATION

Paper Code: BO-505

Contact: 3L+1T

Credits: 4

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- a) Definition-old, new, proposed
- b) Grades of low vision
- c) Statistics/ Epidemiology
- d) Relation between disorder, impairment & handicapped
- e) Low vision optics
 - Magnification-relative distance/ relative size/ approach/angular
 - Optics of Galilian & Keplarian telescope- advantage/disadvantage, significance of exit & entrance pupil.
 - Optics of spectacle magnifier/ determination/ calculation/ disadvantage/advantage.
 - Optics of stand magnifier, significance of equivalent viewing distance & calculations.
 - Telescope- distance/ near/ telemicroscope/ monocular/ binocular/ bioptic.
 - Determination of decentration of lenses /prism/calculation/Lebenson's formula/simple diotric formula.
 - Hand held magnifier-illuminated/ non-illuminated.
 - Spectacle magnifier / half eye/ prism correction/ bar magnifier/ CCTV/ magni-cam/ low vision imaging system or V-max / contact lens & IOL telescope.
- f) Low vision examination:
 - Task/ Goal oriented history-medical/ visual/ psychological history/ task analysis/ mobility/ distance vision/ near vision / daily living/ illumination/ work & school.
 - Visual acuity measurement-distance/ near/ use of log MAR chart (distance & near)/ light house, picture chart/ visual field/ Amsler chart/ contrast sensitivity/ overview of glare testing.
 - Low vision refraction.
- g) Assessment & prescription of low vision devices-optical/ non-optical/ rehabilitation services.
 - Non- optical devices-pen/umbrella/ boldline note book/ illumination/ letter writer/ environmental modification/ signature guide/ needle threader/ eccentric viewing strategies.
- h) Overview of Rehabilitation Services:- definition/ implementation/ vocational guidance/ educational guidance/ mobility & orientation training / special teacher/ special school/ Braille system/ integrated system/referral center- activity/ support/ loan.
- i) Overview of systematic / retinal diseases in relation to low vision:- acromatopsia/ LMBB syndrome/ labers congenital anomaly/ down syndrome/ retinitis pigmentosa/ diabetic retinopathy/ optic atrophy/ albinism/ aniridia.
- j) Counseling of low vision patient/ parents/ guardians/relatives.

Books:

- 1.The Art & Practice of Low Vision , By Freeman & Jose, Butterwort Pub.
- 2.Understanding Low Vision , AFB Publication
- 3.Low Vision, By Faye E.E.

3rd YEAR 1st SEMESTER

CLINICAL REFRACTION - II **Clinical Refraction -II** **(Geriatric & Pediatric Optometry)** Paper Code: BO-503

Contact: 3L+1T
Credits: 4

- a) Assessment of children Vision & Paediatric evaluation, diagnosis & management.
- b) Strabismus & Aniblyopia.

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- c) Non- Strabismic Biocular Disorders.
- d) Neuro- Optometric Rehabilitation.
- e) Evaluation, Diagnosis & Optometric management of children with mental retardation C.P. Dyslexia, Multiple Sensory Motor Handicap.
- f) Visual Disorders in senior citizens, evaluation, diagnosis+ management.
- g) Sports vision.
- h) Refraction in special cases (pseudophakia , aphakia, irregular corneal astigmatism , coloboma of iris, choroids, retina, nystagmus, post R.K., PRK, LASIK)
- i) Congenital cataract, glaucoma.
- j) Patient with low vision.
- k) Patient with anisometropia(Anisokonia)
- l) Monocular & binocular subjective refraction.

Books:

1. Paediatric Optometry, By Jerome Rosner
2. Vision development, By ILG & Bullis
3. Management of Special Population, By Dominique Maino.

Code : BO-592

Contacts: 4P

Credits: 4

Contact Lens –I (Practical)

- a) Routine clinical procedure for contact lens patient & selection of contact lens.
- b) Keratometry & slit lamp Biomicroscopy.
- c) Spherical soft & Spherical RGP contact lens fitting: selection of contact lens Base curve, diameter & Power & fitting Assessment .
- d) Insertion & Removal of soft & RGP contact lens.
- e) Contact lens & maintenance.

Code: BO-593

Contacts: 4P

Credits: 4

Clinical Refraction –II (Practical) (Geriatric & Pediatric Optometry)

1. Assessment of children Vision & Paediatric evaluation, diagnosis & management.
2. Strabismus & Anisometropia.
3. Non- Strabismic Biocular Disorders.
4. Neuro- Optometric Rehabilitation.
5. Evaluation, Diagnosis & Optometric management of children with mental retardation C.P. Dyslexia, Multiple Sensory Motor Handicap.
6. Visual Disorders in senior citizens, evaluation, diagnosis+ management.
7. Sports vision.
8. Refraction in special cases (pseudophakia , aphakia, irregular corneal astigmatism , coloboma of iris, choroids, retina, nystagmus, post R.K., PRK, LASIK)
9. Congenital cataract, glaucoma.
10. Patient with low vision.
11. Patient with anisometropia(Anisokonia)
12. Monocular & binocular subjective refraction.

Low Vision Aids & Visual Rehabilitation (Practical)

Code: BO-595

Contacts: 4P

Credits: 4

B. Optometry Syllabus

- a) Case history.
- b) Assessment.
- c) Application of devices.
- d) Rehabilitation.

SYSTEMIC CONDITIONS & THE EYE

BO-601

1. Arterial Hypertension
 - i) Pathophysiology, classification, clinical examination, diagnosis, complications, management.
 - ii) Hypertension and the eye.
2. Diabetes mellitus
 - i) Pathophysiology, classification, clinical features, diagnosis, complications, management.
 - ii) Diabetes mellitus and the eye.
3. Acquired Heart Disease – Embolism
 - i) Rheumatic heart disease
 - ii) Subacute bacterial endocarditis.
 - iii) Heart disease & the eye.
4. Malignancy
 - i) Definitions, nomenclature, characteristics of benign & malignant neoplasms.
 - ii) Grading and staging of cancer, diagnosis, principles of treatment.
 - iii) Neoplasia and the eye.
5. Connective Tissue Disease
 - i) Anatomy and pathophysiology: Arthritis.
 - ii) Eye and connective tissue disease.
6. Thyroid Disease
 - i) Anatomy and physiology of the thyroid gland.
 - ii) Classification of thyroid disease
 - iii) Diagnosis, complications, clinical features, management of thyroid disease involving eye.
7. Tuberculosis
 - i) Etiology, pathology, clinical features, pulmonary TB, diagnosis, complications, treatment of tuberculosis involving the eye.
8. Tropical Disease and the Eye
 - i) Leprosy.
 - ii) Syphilis.
 - iii) Malaria.
9. Vitamin deficiency and the eye
10. Neurological disease and the eye
 - i) Classification of neurological diseases.
 - ii) Demyelinating diseases
 - iii) Visual pathway lesions
 - iv) Papilloedema.
11. Genetic disorders and the eye.
12. Phacomatoses & the eye.

Reference: 1. Clinical Ophthalmology – Jack J. Kanski (Butterworth-Heinemann)

B. Optometry Syllabus

2. Systemic Disease and the Eye – Do.

PUBLIC HEALTH & COMMUNITY OPTOMETRY **BO-602**

1. Concept of public health.
2. Principles of primary, secondary and tertiary care.
3. Planning of health services.
4. Health economics
5. Health manpower development-a) Basic O.T Practices
b) Familiarity with use of Operating Microscope
6. NPCB and refractive blindness – optometrist's role as primary health care provides.
7. Health cares insurance including role of TPA.
8. Ocular emergencies –
 - a) Foreign body
 - b) Eye Pain
 - c) Watering
 - d) Injuries-perforating, non perforating & chemical

BIOSTATISTICS **BO 603**

1. **Introduction** about Biostatistics, variables, data, population sample, parameter statistics, scales of measurement.
2. **Classification & Presentation of data:** Frequency distribution, Frequency polygon, Bar diagram, Histogram, Frequency distribution curve, CF & CP, Ogive, Percentile & Quartiles.
3. **Descriptive statistics:** Statistics of location, Mean Median Mode, Geometric mean, Range, Statistics of Dispersion, Mean Deviation, Standard Deviation, Coefficient of Variation. Correlation & Regression.
4. **Sampling Statistics:** Sampling & Sampling Distribution, Sampling Errors & sampling statistics, Standard errors, Degree of freedom, Types of Sampling.
5. **Probability Distribution:** Classical definition, Conditional probability, Probability in continuous, Joint distribution of random variables.
6. **Experimental Design:** Controlled and uncontrolled experiment, Sampling types, Sample size & pilot experiment, Single factor experiment & Factorial experiment-example, Analysis of variance (ANOVA).
7. **Applications:** Collection, presentation and analysis of hospital statistical data with examples. Collection, presentation and analysis of Optometric and ophthalmologic data with a few examples.

CONTACT LENS – II **BO-604**

1. Contact lens fitting in astigmatism.

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2. Contact lens fitting in keratokonus.
3. Contact lens fitting in children.
4. RGP lenses – low D.K. and high D.K. lenses.
5. Instructions regarding handling and care of lenses.
6. Cosmetic and prosthetic contact lenses.
7. Extended wear lenses versus Daily wear
8. Disposable lenses
9. Contact lens – Toric, Bifocal, Multifocal.
10. Therapeutic lenses / Bandage lenses.
11. Contact lens solutions – principle of action, compositions
12. Ordering contact lenses – writing prescription to the lab.
13. Contact lens – modifications of finished lenses (RGP).
14. Checking the parameters.
15. Recent advances in contact lenses.
16. Follow up examinations
17. Contact lens complications and their management.
18. Prosthetic eye fitting procedures & conformers.

REFERENCES:

1. Fitting Guide for Rigid and Soft Contact Lenses – H. A. Stein, Slatt, M. L. Freeman (Mosby).
2. IACLE Module.
3. Contact Lenses (The CLAO Guide to Basic Science and Clinical Practice). – Kenddall/Hunt Publishing Co.
4. Text Book of Contact Lenses – V. K. Dada (Jaypee).

PROFFESIONAL PRACTICE MANGEMENT

BO-605

1. Law & Optometry

- Laws governing medical and paramedical professions
- Consumer act with respect to optometry and dispensing of optical Aids.
- International optometry.
- Personal and professional insurance (indemnity).
- Employment and contacts.
- Partnership and alternatives.
- Ethics.
- Negligence.

2. Basic Accountancy and Public relations

- Introduction.
- Terms used in accounts, Principles of accountancy.
- Journal & ledger
- Trial Balance
- Subsidiary books, petty cash book, sales register, purchase register, stock register
- Bank reconciliation and Banking procedures.
- Depreciation.
- Balance sheet and profit & loss accounts.

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- General ideas about Income tax and sales tax.
- Project report and financial inability.
- Costing in practice (Buying, stock-keeping, assessment of fees and costing of appliance).

Public relations.

- Definitions.
- PR- its disfunction from publicity, propaganda & advertising.
- Internal and external aspects of PR
- Phases of PR: analysis building, promotion of product or services, better employee, government and community relation.

3. Methods of public relations:

- Press relations: Press release, Press conference, and Letter to editor.
- Printed work: Style, colour & design.

4. Case Study:- (at least ten Cases) as per format

APPLIED OPTOMETRY AND ORTHOPTICS

BO 606

1. ORTHOPTIC INSTRUMENTS

- ♦ Prism Bar
- ♦ Synoptophore
- ♦ Maddox Wing
- ♦ Maddox Rod
- ♦ Red Green Goggles
- ♦ Hess Screen
- ♦ Risley Prisms

Investigative procedures

- ♦ Motor signs in squint
 - A) Head position: Face turn, chin position, Head tilt.
 - B) Cover test & cover-uncover tests
 - C) Maddox wing to assess heterophoria.
- ♦ Assessment of degree of squint
 - a) Hirschbag test.
 - b) Prism bar test.
 - c) Krimsky test
 - d) Synoptophore test
- ♦ Assessment of ocular motility status
 - a) Hess chart
 - b) Diplopia testing
 - c) Bielschowskys Head tilting test
- ♦ Assessment of visual sensory status in squint.
 - Amblyopia
 - Suppression
 - Binocular single vision – SMP, Fusion, Stereopsis.
- ♦ Mechanisms leading to squint
 - Types of squint – a) latent / manifest

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- b) horizontal / vertical
- c) paralytic / concomitant

Orthoptic Treatment Procedures

Management of –

- Convergence insufficiency
- Amblyopia
- Suppression
- ARC
- Use of prism -
For Exercise & correction

7. AMBLYOPIA

- Definition.
- Neuropathology.
- Classification.
- Clinical Features.
- Treatment.
 - a) Occlusion.
 - b) Penalisation.
 - c) Role of drugs.

CONTACT LENS – II (Practical) BO-694

1. Fitting and assessment of contact lenses – steep, flat, optimum on spherical cornea.
2. Fitting and assessment of contact lenses – steep, flat, optimum on toric cornea with spherical lenses.
3. Fitting and assessment of contact lenses – steep, flat, optimum on toric cornea with toric lenses.
4. Teaching the patient to insert and remove contact lenses.
5. Writing Contact Lens prescriptions.

APPLIED OPTOMETRY AND ORTHOPTICS (Practical) BO 696

1. Demonstration of following Orthoptic instruments/methods and their uses –
 - ◆ Prism Bar
 - ◆ Synoptophore
 - ◆ Maddox Wing
 - ◆ Maddox Rod
 - ◆ Red Green Goggles
 - ◆ RAF Gauge
 - ◆ Cover test
 - ◆ Hirschberg test
 - ◆ Krimsky test
 - ◆ Diplopia charting
 - ◆ Visuoscopy
 - ◆ Accommodative flipper
2. Orthoptic Investigative & Therapeutic Procedure.
3. Case records.

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4. Case Handling

Reference:

- Clinical Orthoptics ---- Fiona Rowe (Blackwell Scientific Publications)
- Handbook of Orthoptic Principles --- Cashell & Durran (Churehill Livingstone)
- Strabismus – Prieto-Diaz & Sowza-Dias (Butterworth Heseman)
- Seal's ---- Text Book of Ophthalmology, 5th ed.

Bachelor of Optometry

Seventh Semester

A. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	
Total of Theory						0	0
SESSIONAL							
1	BO-781	Project Work					8
Total of Sessional						0	8
<u>Total of Semester</u>			0				8

Duration of the Project Work is Twenty Weeks

Eight Semester

B. THEORY							
SL .N O.	CODE	THEORY	CONTACTS (PERIODS/WEEK)				CREDITS
			L	T	P	TOT AL	

B. Optometry Syllabus

Total of Theory						0	0
SESSIONAL							
1	BO-881	Internship					8
2	BO-882	Comprehensive Viva-Voce					6
Total of Sessional						0	14
<u>Total of Semester</u>				0		14	

Duration of the Internship is Twenty Weeks

OPTOMETRIST HELPER